AMENDMENTS TO THE CLAIMS

1. (currently amended) A system for detecting acousto-photonic emissions in optically turbid media, comprising:

a sound source ~~operative to generate~~ for generating an ultrasonic wave for propagation through an optically turbid medium;

a light source ~~operative to generate~~ for generating a signal light beam~~, the signal beam being directed toward~~ for transmission through the optically turbid medium, and for generating a reference light beam,

wherein the signal light beam is phase modulated in the presence of the ultrasonic wave within an interaction region of the optically turbid medium; ~~and~~

a photo-detector including a photo-refractive crystal ~~operative to receive~~ for receiving the phase modulated signal light beam and the reference light beam, and ~~to convert~~ for converting the phase modulated signal light beam to an intensity modulated signal light beam by interference of the phase modulated signal light beam and the reference light beam within the photo-refractive crystal, the intensity modulated signal light beam having a DC component~~,~~; and

~~wherein~~ a signal analyzer for analyzing the DC component of the intensity modulated signal light beam ~~has a DC offset having an amplitude that is a function of a modulated photon density~~ to obtain a measure of a magnitude of a mean phase shift induced by the ultrasonic wave on the signal light beam ~~in~~ within the interaction region of the optically turbid medium, and for analyzing at least one change in the magnitude of the mean phase shift, ~~wherein the DC offset is~~ the at least one change in the

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magnitude of the mean phase shift being indicative of an object or an abnormality at the interaction region of the optically turbid medium.

2. (original) The system of claim 1 wherein the sound source includes an acoustic transducer.

3. (original) The system of claim 2 wherein the acoustic transducer comprises a piezoelectric transducer.

4-6. (canceled)

7. (currently amended) The system of claim ~~6~~1:

~~wherein the light source is operative to generate a first light beam,~~

wherein the light source ~~further including~~ includes a laser for generating a coherent light beam, and a beam splitter ~~operative to split~~for splitting the ~~first~~ coherent light beam to produce the signal light beam and ~~a~~ the reference light beam~~, and wherein the photo-refractive crystal is operative to receive the phase modulated signal beam and the reference beam, to convert the phase modulation of the signal beam to intensity modulation by interference of the signal beam and the reference beam within the crystal, and to provide the intensity modulated signal beam~~.

8. (currently amended) The system of claim ~~7~~1 wherein the photo-detector further includes a photo-diode ~~operative to receive~~for receiving the intensity modulated signal light beam.

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9. (currently amended) The system of claim ~~7~~ 1 further including an AC field source ~~operative to provide~~for providing an AC field to the photo-refractive crystal.

10. (canceled)

11. (currently amended) A method of detecting acousto-photonic emissions in optically turbid media, comprising the steps of:

generating, by a sound source, an ultrasonic wave for propagation through an optically turbid medium;

generating, by a light source, a signal light beam and a reference light beam, ~~;directing the signal beam toward~~ the signal light beam for transmission through the optically turbid medium,

wherein the signal light beam is phase modulated in the presence of the ultrasonic wave within an interaction region of the optically turbid medium; ~~and~~

converting the phase modulated signal light beam to an intensity modulated signal light beam by interference of the phase modulated signal light beam and the reference light beam within a photo-refractive crystal, the intensity modulated signal light beam having a DC component;

~~wherein~~ analyzing, by a signal analyzer, the DC component of the intensity modulated signal light beam ~~has a DC offset having an amplitude that is a function of a modulated photon density~~ to obtain a measure of a magnitude of a mean phase shift induced by the ultrasonic wave on the signal light beam ~~in~~ within the interaction region of the optically turbid medium~~,~~; and

analyzing, by the signal analyzer, at least one change in the magnitude of the mean phase shift induced by the ultrasonic wave

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on the signal light beam, ~~wherein the DC offset is~~ the at least one change in the magnitude of the mean phase shift being indicative of an object or an abnormality at the interaction region of the optically turbid medium.

12. (currently amended) The method of claim 11:

wherein the sound source includes an acoustic transducer; and

wherein the generating of the ultrasonic wave includes generating the ultrasonic wave using the acoustic transducer.

13. (currently amended) The method of claim 12:

wherein the acoustic transducer comprises a piezoelectric transducer; and

wherein the generating of the ultrasonic wave includes generating the ultrasonic wave using the piezoelectric transducer.

14. (currently amended) The method of claim 11:

wherein the light source includes a laser; and

wherein the generating of the signal light beam and the reference light beam includes generating the signal light beam and the reference light beam using the laser.

15. (canceled)

16. (currently amended) The method of claim ~~11~~14 ~~further including~~ wherein the ~~steps of~~ generating of the signal light beam further includes:

generating, by the laser, a ~~first~~ coherent light beam ~~by the light source,~~ ; and

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splitting the ~~first~~ coherent light beam to produce the signal light beam and ~~a~~ the reference light beam~~, providing the phase modulated signal beam and the reference beam to a photo-refractive crystal, and wherein the converting step includes converting the phase modulation of the signal beam to intensity modulation by interference of the signal beam and the reference beam within the crystal~~.

17. (currently amended) The method of claim ~~16~~ 11 further including ~~the step of~~ providing an AC field to the photo-refractive crystal.

18. (canceled)

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